# STUDIES IN THEACEAE. II
# CLEYERA

CLARENCE E. KOBUSKI

*With plate 201*

THE ASIATIC GENUS CLEYERA, first described by Thunberg in his Nov. Gen. **3:** 69. 1783, was named in honor of the physician and botanist Andrew Cleyer, Dutch Director of Commerce during the years 1683–88. Thunberg described a single species and based his description on plants growing near Nagasaki, Japan.

Unfortunately this description was based upon two shrubs as a casual examination of the type indicates. Nearly filling the sheet is an ample specimen of *Cleyera japonica*, while in the upper right corner is a fragment or a near fragment of *Ternstroemia gymnanthera* (W. & A.) Sprague.

Thunberg named "Mokohf" or "Mukohf" of Kaempfer (Amoen. Exot. Fasc. V. p. 873, fig. p. 774. 1712) as a synonym of his new *Cleyera japonica*. Not realizing he was working with two distinct genera of the Theaceae, Thunberg, nine years later noticing the discrepancy mentioned above, came to the conclusion that *Cleyera* was congeneric with *Ternstroemia* and transferred his *Cleyera japonica* to *Ternstroemia* under the name *T. japonica*.

In 1841, Siebold & Zuccarini took up the original name *Cleyera*. They drew attention to the fact that Thunberg undoubtedly did have the two distinct elements in hand when he first described *Cleyera*. At the same time, however they emended his description and pointed out that careful study showed that regardless of what material Thunberg had, his actual generic description was based on the specimen of *Cleyera* and could refer only to *Cleyera*. True enough, in the specific description, the leaf arrangement refers to *T. japonica* (*T. gymnanthera* Sprague). However, this does not affect the status of the genus. They cleared up the whole matter and treated in detail both original elements under their respective genera giving the specific epithet "japonica" to both. Recently, Sprague realizing that *T. japonica* could not be retained, made the combination *T. gymnanthera* (W. & A.) Sprague.

With Siebold & Zuccarini's work confusion should have ended because their treatment of the whole subject seems very clear and quite final. Sprague's treatment of the generic status of *Cleyera* in Jour. Bot. **41:** 17, 83 (1923) did much to clear up the whole situation and probably directly or indirectly, caused the name *Cleyera* to be placed on the list of "*nomina conservanda*" by the International Congress of 1935.

Szyszylowicz in his treatment of *Cleyera* in Engler & Prantl, Nat. Pflanzenfam. III. Abt. **6:** 189 (1893) placed the genus under *Eurya* as a section. In a later treatment in the same publication ed. 2, **21:** 147 (1925) Melchior made *Cleyera* a subgenus of *Eurya*. Since that time botanists have vacillated between the use of the names *Eurya* and *Cleyera*. However, *Cleyera* is so markedly different from *Eurya* in character that even though students used the name *Eurya*, they were always conscious of the distinct lines of separation.

Other names applied to the genus were *Tristylium* Turczaninow (in Bull. Soc. Nat. Moscow, **31:** 247. 1858) as interpreted by Merrill (in Philipp. Jour. Sci. **13:** 148. 1918) and *Sakakia* Nakai, Fl. Sylv. Kor. (**17:** 77, t. 19. 1928).

*Sakakia* is clearly a true synonym of *Cleyera*, the name having been proposed by Nakai hoping to clear up the involved synonymy. Evidently unaware of the action taken by the International Congress in the case of *Cleyera*, the Japanese botanists have all rallied to Nakai and wholeheartedly accepted the change. Several new species and varieties have been described under this name. Incidentally, *Sakakia* would have been a fitting name because the plant is generally known in the Japanese empire as "Sakaki."

In the present paper a single species with several varieties is recognized. Because of the many references cited in the synonymy of the species, most of which apply to the genus as well, the author has made it a point to cite in the generic treatment only those references necessary for a clear understanding.

The institutions from which material for this study was borrowed along with the abbreviations used in this paper are as follows: herbarium of the Arnold Arboretum (AA), Gray Herbarium of Harvard University (G), herbarium of the New York Botanical Garden (NY), herbarium of the Natural History Museum, Vienna (V).

**Cleyera** Thunberg, Nov. Gen. **3:** 69 (1783). — Siebold & Zuccarini, Fl. Jap. 153, t. 81 (1841). — Choisy in Mém. Soc. Phys. Hist. Nat. Genève, 1854, 14 (Mém. Ternstroem. 21) (1855); as to sp. 1 & 2 (excl. sp. 3–7). — Bentham & Hooker, Gen. Pl. **1:** 183 (1862), in part. —

Sprague in Jour. Bot. **41:** 17, 83 (1923). — Internat. Rules Bot. Nomencl. ed. 3, p. 135 (1935). PLATE 201[1]

*Tristylium* Turczaninow, ex Bentham & Hooker, Gen. Pl. **1:** 183 (1862); as synon. of Cleyera. — Merrill in Philipp. Jour. Sci. **13:** 148 (1918).

*Eurya* § *Cleyera* Szyszylowicz in Engler & Prantl, Nat. Pflanzenfam. III. Abt. **6:** 189 (1893).

*Eurya* subg. *Cleyera* Melchior in Engler & Prantl, Nat. Pflanzenfam. ed. 2, **21:** 147 (1925).

*Sakakia* Nakai, Fl. Sylv. Kor. **17:** 77, t. 19 (1928).

Small tree or shrub. Leaves evergreen, alternate, variable in size and shape, from elliptic to elliptic-obovate or obovate, usually cuneate at the base, variable at the apex, petiolate, entire (except in *C. japonica* var. *lipingensis*). Flowers hermaphroditic, solitary or in fascicles in the leaf axils; peduncles thickened at apex, bibracteate, bracts minute, alternate, near apex of peduncle; sepals 5, imbricate, ciliate; petals 5, imbricate, connate at base, reflexed at anthesis; stamens about 25, anthers hispid, biloculate with longitudinal openings; ovary glabrous, 2–3-celled; ovules many; style elongate, bi- or trifid at apex. Fruit baccate, nearly spherical to ovoid-oblong in shape, many-seeded; seeds with thin endosperm and curved embryo.

**Cleyera japonica** Thunberg, Nov. Gen. **3:** 69 (1783), pro parte; Fl. Jap. 12 (1784), pro parte. — De Candolle, Prodromus, **1:** 524 (1824), pro parte. — Siebold & Zuccarini, Fl. Jap. 153, t. 81 (1841). — Walpers, Repert. Bot. Syst. **1:** 370 (1842). — Siebold & Zuccarini in Abh. Akad. Münch. **4**, abt. **2:** 164 (Fl. Jap. Fam. Nat. 56) (1845). — Miquel in Ann. Mus. Bot. Lugd.-Bat. **3:** 14 (Prol. Fl. Jap. 202) (1866). — Franchet & Savatier, Enum. Pl. Jap. **1:** 57 (1875). — Ito & Kaku, Fig. Descript. Pl. Koishikawa Bot. Garden, **2:** t. 18 (1883). — Matsamura, Nippon Skokubutsu meii, 53, no. 631 (1884). — Tanaka, Useful Pl. Japan, 164 (1895). — Sprague in Jour. Bot. **41:** 17, 83 (1923). — Masamune in Trans. Nat. Hist. Soc. Formosa, **25:** 250 (1935). — Internat. Rules Bot. Nomencl. ed. 3, p. 135 (1935).

*Ternstroemia japonica* Thunberg in Trans. Linn. Soc. **2:** 335 (1794), pro parte.

*Cleyera ochnacea* De Candolle in Mém. Soc. Phys. Genéve, **1:** 43 (Mém. Fam. Ternstroem. 21) (1822); Prodr. **1:** 524 (1824). — Sprengel, Syst. Veg. **2:** 596 (1825). — G. Don, Gen. Hist. **1:** 566 (1831). — Dyer in Hooker f., Fl. Brit. India, **1:** 283 (1874). — Forbes & Hemsley in Jour. Linn. Soc. Bot. **23:** 76 (1886). — A. E. Osmaston, For. Fl. Kumaon, 42 (1927).

[1]PLATE 201. Photograph of generic type in Herbarium Thunberg at the Botanic Museum, Upsala, Sweden. Photograph taken by Prof. Alfred Rehder in 1928.

*Cleyera ochnacea* DC. α *Kaempferiana* De Candolle in Mém. Soc. Phys. Genève, **1**: 43 (Mém. Fam. Ternstroem. 21) (1822); Prodr. **1**: 524 (1824).

*Ternstroemia Lushia* Hamilton ex D. Don, Prodr. Fl. Nepal. 225 (1825).

*Cleyera ochnoides* Wallich ex G. Don, Gen. Syst. Bot. **1**: 566 (1831).

*Cleyera Lushia* Hamilton ex G. Don, Gen. Syst. Bot. **1**: 566 (1831).

*Cleyera Lushia* G. Don var. β *Wallichiana* G. Don, Gen. Syst. Bot. **1**: 567 (1831).

*Cleyera Wallichiana* Siebold & Zuccarini, Fl. Jap. **1**: 154 (1841).

*Cleyera Mertensiana* Siebold & Zuccarini, l.c. (1841).

*Cleyera ochnacea* DC. var. *Lushia* (D. Don) Dyer in Hooker f., Fl. Brit. India, **1**: 284 (1874).

*Eurya ochnacea* (DC.) Szyszylowicz in Engler & Prantl, Nat. Pflanzenfam. III. Abt. **6**: 189 (1893). — Shirasawa, Icon. Ess. For. Jap. **2**: t. 53, figs. 18–31 (1908). — Matsamura, Ind. Pl. Jap. **2**. pt. 2, 359 (1912). — Rehder & Wilson in Sargent, Pl. Wilson. **2**: 399 (1915). — Chun in Mem. Sci. Soc. China, **1**: 173 (Trees Shrubs China) (1924). — Melchior in Engler & Prantl, Nat. Pflanzenfam. ed. 2, **21**: 147 (1925). — Makino & Tanaka, Man. Fl. Nippon, 357 (1927). — Hozo, Kishiu shokobutsu-shi; Flora Kii Prov. 112 (1929). — Naito & Kajiwara in Bull. Kagoshima Imper. Coll. Agric. For. **1**: 392 (1934).

*Tristylium ochnaceum* (DC.) Merrill in Philipp. Jour. Sci. **13**: 148 (1918). — Rehder & Wilson in Jour. Arnold Arb. **8**: 177 (1927). — Merrill in Lingnan Sci. Jour. **11**: 49 (1932).

*Freziera ochnacea* (DC.) Nakai ex Mori, Enum. Pl. Cor. 251 (1922).

*Sakakia ochnacea* (DC.) Nakai, Fl. Sylv. Kor. **17**: 77, t. 19 (1928). — Yoshino, Fl. Bitchuensis, 20 (1929). — Masamune in Mem. Fac. Sci. Agric. Taihoku Imper. Univ. **11**: no. 4, 302 (Flor. Geobot. Stud. Yakusima) (1934). — Kanehira, Formosan Trees, ed. 3, 469, fig. 429 (1936).

DISTRIBUTION: Japan, Korea, Formosa, China, India.

SPECIMENS EXAMINED:

JAPAN: Near Nagasaki, *Thunberg* (type, photo. in AA); Nagasaki, *C. J. Maximowicz* in 1863 (AA); alt. 100–1000 m., Mt. Kirishima, Kyushu, *Z. Tashiro* for E. H. Wilson, June 24, 1927 (AA); "Hizen" *K. Sakurai,* May 11, 1910 (AA); Yakusima, *G. Masamune,* Aug. 23, 1924 (NY); temple grounds near Nakatsu-gawa, *C. S. Sargent,* Oct. 22, 1892 (tree 6–9 m.; probably cultivated) (AA); woods, Tosa Prov., Shihoku, *E. H. Wilson,* no. 7789, Nov. 17, 1914 (small tree 6–10 m. with black fruit) (AA); Kunigami-gun, Loochoo Isl., *R. Kanehira,* no. 3241, Jan. 5–6, 1934 (NY); Osima, Nozi-gawa-Yuwan, Loochoo Isl., *R. Kanehira,* no. 3394, Mar. 22, 1934 (NY); Coll. of Yokohama Nurs. Co. on Loochoo Isl., 1914 (AA).

KOREA. Quelpaert Isl.: common in ravines on south shore,

*E. H. Wilson,* no. 9490, Nov. 2, 1917 (bush 1:5–2.5 m. with black fruit) (AA); in forests, *U. Faurie,* no. 495, Oct. 1906 (AA); in forests, *U. Faurie,* nos. 1641, 1642, 1643, July 1907 (AA); in forests, *E. Taquet,* no. 591, July 1908; no. 2692, July 1909; no. 2693, Oct. 1909; no. 4136, July 1, 1910 (AA).

CHINA. Chekiang: open thickets, Sui-an hsien, *Y. L. Keng,* no. 797, July 15, 1927 (AA); shady woods, Tung-yang hsien, alt. 450 m., *Y. L. Keng,* no. 932, Aug. 1, 1927 (evergreen shrub) (AA); locality lacking, *S. Chen,* no. 1546, June 1933 (AA); Tienmushan, *T. N. Liou,* no. L. 3, July 22, 1930 (NY); alongside stream, Tai-shun, *Y. L. Keng,* no. 287, Aug. 4, 1926 (glabrous evergreen tree) (AA). Fukien: under dense wood, northern part of province, alt. 1000 m., *R. C. Ching,* no. 2279, Aug. 5, 1924 (tree 10 m.) (AA, V). Anhwei: common in woods along stream, S. Chemen, alt. 250 m., *R. C. Ching,* no. 3207, Aug. 13, 1925 (small tree, 12 m. with smooth gray bark) (AA); in wood, Whang shan, alt. 450 m., *R. C. Ching,* no. 2899, July 5, 1925 (shrub 6 m. high with smooth gray bark, buds purplish green) (AA). Kiangsu: in thickets, Hai Wei, S. I-Shingon, near border of Chekiang, alt. 200 m., *R. C. Ching & Tso,* no. 512, May 17, 1926 (small shrub of stately form, 3 m. tall with gray bark; flowers nodding, petals amber) (AA); mountainous thickets, Ching-shan, I-shing, *Y. L. Keng,* no. 2649, Aug. 26, 1929 (small evergreen tree, 3 m. with dark grey smooth bark) (AA). Kiangsi: along stream in partial shade, Kuling, alt. 1000 m., *C. Y. Chiao,* no. 18707, July 27, 1928 (NY); Lushan Mts., alt. 700–800 m., *H. H. Chung & S. C. Sun,* no. 646, July 23, 1933 (NY, AA); common, side of streams, Kuling, alt. 1200 m. *E. H. Wilson,* no. 1546, July 28, 1907 (bush 1–2 m.) (AA, G); along roadside, Ta Yeh Tsun, Lu Shan, alt. 800 m., *A. N. Steward & H. C. Cheo,* no. 506, Oct. 22, 1932 (shrub 2 m.) (AA). Kwangsi: in thickets, Bin Long, Min Shan, N. Luchen, alt. 1200 m., *R. C. Ching,* no. 6019, June 14, 1928 (small tree with brownish bark, 6 m.; flowers whitish, nodding, scented) (NY). Yunnan: exact locality and date lacking, *G. Forrest,* no. 26771 (AA); *G. Forrest,* nos. 16080, 18181, coll. 1917–1919 (AA).

From ancient times this species has been known and revered in the Japanese Empire under the name "Sakaki." It grows wild in the mountainous districts and can be found planted around the homes and about Shinto shrines. It is sometimes called "Mijam Sakaki" meaning "God-of-the-high-mountains." "Tamakushige," a kind of wand, dedicated to the gods has been made from this plant explaining the name "Tree-of-God." According to Siebold & Zuccarini, the Buddhists revere the tree

because their priests maintain it is a species close to the "Sara tree" under which the divine founder of their cult died. The fruit is known in Japan as "Ringan." Medically, I understand, the species is used for dysentery, consumption and for the treatment of mental diseases.

According to Ito & Kaku there are many varieties of this species such as small-leaved, long-leaved and round-leaved. A study of a large amount of material bears out their statement, variation being so great that to definitely separate varieties, to say nothing of species, seems almost hazardous. However, there are some varieties, sometimes localized, that seem worthy of recognition. These are treated below.

## KEY TO THE FORM AND VARIETIES

Leaves entire
  Leaves variegated ..... forma **tricolor**
  Leaves not variegated
    Leaves approximately 2 cm. wide or less, not more than 8 cm. long.
      Leaves up to 8 cm. long, oblong-lanceolate; Formosan variety ..... var. a. **Hayatai**
      Leaves up to 5 cm. long, elliptic; Kwangtung variety ..... var. b. **parvifolia**
    Leaves up to 5 cm. wide; up to 15 cm. long.
      Larger leaves 10–15 cm. long, generally acuminate at apex; Indian and western Chinese variety ... var. c. **grandiflora**
      Larger leaves usually below 10 cm. long, generally obtuse at apex; Formosan variety ..... var. d. **Morii**
Leaves serrate ..... var. e. **lipingensis**

**Cleyera japonica** Thunberg emend. Sieb. & Zucc. forma **tricolor** (Nicholson), stat. nov.

*Cleyera japonica tricolor* Nicholson, Ill. Dict. Gard. **1**: 342 (1885).
*Cleyera japonica* var. *tricolor* Hort. ex Miller in Bailey, Cyclop. Amer. Hort. **1**: 335 (1900); in Bailey Stand. Cyclop. Hort. **2**: 802 (1914).
*Eurya latifolia variegata* A. Verschaffelt in Exp. Gand. 1862 ex Bull. Fed. Soc. Hort. de Belgique (1887) p. 394.
*Cleyera Fortunei* Hooker f. in Gard. Chron. **17**: 10, fig. 1 (1895); in Bot. Mag. **121**: t. 7434 (1895). — Bean, Trees Shrubs Hardy Brit. Isles, ed. 1, **1**: 373 (1914).
*Cleyera japonica foliis variegatis* A. Verschaffelt in Exp. Gand. 1862 ex Bull. Fed. Soc. Hort. de Belgique (1887) p. 394.

SPECIMENS EXAMINED:

HORT. — *G. Nicholson*, no. 1782, July 19, 1880, collected in the Royal Botanic Gardens, Kew (AA). — *M. Gebhardt*, Jan. 16, 1889, collected in a greenhouse on the estate of Count Arnim, Muskau, Silesia (AA).

Both specimens cited above are without flowers or fruit. This sterile

condition seems quite typical of this form. In leaf shape this form is identical with the eastern Chinese specimens giving rise to the belief that China rather than Japan is the place of origin. Hooker also seems to share this belief. The texture of the leaf in this form is much thinner than the typical species, a condition found often in variegated forms and generally associated with absence of chlorophyll in the leaf or parts of the leaf. Hooker (1895) in describing *Cleyera Fortunei* remarked that the species had been in cultivation for nearly thirty years, and until flowers were borne, was thought to be a broadleafed species of *Eurya* (*E. latifolia variegata*) having its young leaves stained with a fiery orange. In Bot. Mag. he states that the leaves are "bright green, variegated with golden yellow and scarlet towards the margins." An evergreen shrub with these color features must be a beautiful sight indeed. One would expect it to be found more often in cultivation than it is. This color variegation in the leaves is the only feature separating the form from the actual species.

**Cleyera japonica** Thunberg emend. Sieb. & Zucc. var. a. **Hayatai** (Masamune & Yamamoto), comb. nov.

*Sakakia Hayatai* Masamune & Yamamoto in Jour. Soc. Trop. Agric. 5: 350 (1933). — Yamamoto in Sylvia, 5: 43, fig. 37 (1934).

DISTRIBUTION: Formosa.

SPECIMENS EXAMINED:

FORMOSA: in monte Buisan, *E. Matsuda,* July 1918 (leaf spec. ex herb. Yamamoto); Noka, prov. Nanto, alt. 2333–2833 m., *E. H. Wilson,* no. 10056 (bush 6–15 ft., fruit black, common) (AA).

Yamamoto during his recent American visit left at the Arnold Arboretum a leaf specimen of *Cleyera japonica* var. *Hayatai* for study. Although no number was listed the leaf undoubtedly was taken from one of the syntypes, both syntypes being collected by Matsuda during July 1918 in the same locality. On Yamamoto's label is the name "*Sakakia canicosae* (Merrill) Yamamoto." No reference to this name could be found in literature. A discussion with Merrill, the parenthetical author, concerning this name brought out the information that the name could be nothing more than an annotation on an herbarium specimen, since Merrill discredits ever describing a species under this name.

Masamune & Yamamoto in describing their species *Sakakia Hayatai* list as synonyms *Cleyera Matsudai* and *Sakakia Matsudai.* The latter synonym was cited "excl. Syn." These two synonyms belong to *Eurya Matsudai* Hayata, a recognized species of *Eurya* at the present time. *Eurya Matsudai* Hayata as described and figured is a true *Eurya.* There is nothing in the description warranting the transfer of *Eurya Matsudai*

to *Sakakia*. Probably a specimen incorrectly labeled *Cleyera Matsudai* Hayata in one of the Formosan herbaria led to the transfer by Masamune to *Sakakia Matsudai*.

**Cleyera japonica** Thunberg emend. Sieb. & Zucc. var. b. **parvifolia,** var. nov.

A typo recedit foliis ellipticis minoribusque, 3.0–5.5 cm. longis, 1.5–2.0 cm. latis.

DISTRIBUTION: Kwangtung.

SPECIMENS EXAMINED:

KWANGTUNG: dry, level land, roadside, Chun Fa Shu, Sam Kok Shan, Tsungfa-Lungmoon Districts, *W. T. Tsang,* no. 20600 (type), May 29, 1932 (3.5 m. tall, flowers white) (NY); common in meadows and on roadsides, Tung Koo Shan, Tapu District, *W. T. Tsang,* no. 21683 (AA), Sept. 8–29, 1932 (shrub 1.5 m., fruit black) (AA, NY); Loh Fau Shan, *C. O. Levine,* no. 568, Oct. 27–30, 1916 (AA); vicinity of Canton, *C. O. Levine,* no. 1453, Aug. 17, 1917 (AA); dry ground in forest, Naam Kwan Shan, Tsengshing District, *W. T. Tsang,* no. 20323, Apr. 24, 1932 (1.75 m. tall, flowers white (NY); Loh Fau Shan, *E. D. Merrill,* no. 10686, Aug. 17, 1917 (NY); Pak-wan Cheung, Wai-yeung District, alt. 750 m., *T. M. Tsui,* no. 162, March 1932 (1.5 m. tall, flowers white) (NY).

As *C. japonica* Thunb. var. *grandiflora* (Choisy) Kobuski represents the large form of the typical species so does the variety described above represent the smaller variation. The leaves are quite elliptic, never obovate, at least in the specimens studied. It has the general number of stamens of the genus (24–25) which are hirsute. This variety is confined to the province of Kwangtung.

**Cleyera japonica** Thunberg, emend. Sieb. & Zucc. var. c. **grandiflora** (Wallich ex Choisy), comb. nov.

*Cleyera grandiflora* Wallich, Num. List, no. 1461 (1829), nom. nud.
*Cleyera grandiflora* Wallich ex Choisy in Mém. Soc. Phys. Genève, 1854, 14 (Mém. Ternstroem. 21) (1855).
*Cleyera ochnacea* DC. var. *grandiflora* (Wallich ex Choisy) Dyer in Hooker's Fl. Brit. Ind. **1**: 284 (1874).
*Cleyera grandiflora* Hooker f. & Thoms. ex Dyer in Hooker's Fl. Brit. Ind. **1**: 284 (1874).

DISTRIBUTION: India, Szechuan, Yunnan, Tibet.

SPECIMENS EXAMINED:

SOUTHEASTERN TIBET: Salween Valley at Champutong, Mount Kenyichumpo and region of Champutong, Salween-Irrawadi watershed, alt.

2450 m. *J. F. Rock*, nos. 10225, 10245, coll. in 1923 (woody climber; fls. cream colored) (AA). YUNNAN: data lacking, *G. Forrest*, no. 8424 (AA). EASTERN SZECHUAN: Wushan Hsien, *E. H. Wilson* (Veitch Exped.) no. 2688, Oct. 1900 (AA). INDIA: Khasia, alt. 600 m., *J. D. Hooker & T. Thomson* (probable isotype of *C. grandiflora* Hook. f. & Thoms.) (G.); below Dharmgadh in the Sarju Valley, East Almora, United Provinces, alt. 1500 m., *A. E. Osmaston*, no. 1484, Jan. 26, 1932 (shrub or small tree) (AA); Dindihat to Askot, Almora District, alt. 1500 m., *R. N. Parker*, no. 2047, Jan. 7, 1923 (AA); Upper Burma, *G. Forrest*, no. 27556, coll. 1924–25 (AA); western Nepal, *Bis Ram*, no. 573, June 25, 1929 (AA); Mausmai, Assam, alt. 1200 m. *L. R. Ruse*, no. 145, May 18, 1923 (AA).

Localized in India, western China and Tibet, this variety is distinguished from the species only in its uniformly larger size. Leaf measurement in the specimens studied vary up to a maximum of 15 cm. long and 5.5 cm. wide. The peduncles are sturdier than the normal species, and in a single instance one measuring 2 cm. was found.

This variety was first described as *Cleyera grandiflora* Choisy in 1855. Later, Dyer in Hooker's Fl. Brit. Ind. (**1:** 284. 1874) reduced Choisy's species to *Cleyera ochnacea* var. *grandiflora*. In the same publication Hooker f. & Thomson's species (not of Wallich or Choisy) *Cleyera grandiflora* was described. The synonymy became involved at this point because Hooker f. & Thomson, thinking naturally that their species was different from Choisy's now reduced species, used the same name, *Cleyera grandiflora*. Some of the differences used in separating these two in Hooker's Fl. at that time were: (1) fascicles 2–4 flowered against flowers usually solitary; (2) leaves narrower, more acuminate against leaves oblong, obtusely acuminate; (3) apex of peduncles with two almost obsolete bracts against peduncles with minute alternating bracts. Variation in these characters is, in general, too great to permit separation. As mentioned above, the only basis for even varietal distinction from the species is size.

**Cleyera japonica** Thunberg emend. Sieb. & Zucc. var. d. **Morii** (Yamamoto) Masamune in Trans. Nat. Hist. Soc. Formosa, **25:** 250 (1935).

*Eurya ochnacea* DC. var. *Morii* Yamamoto, Suppl. Icon. Pl. Formos. **3:** 40, fig. 13 (1927).

*Tristylium ochnaceum* Merrill var. *Morii* Sasaki, List Pl. Formosa, 294 (1928).

*Sakakia Morii* (Yamamoto) Yamamoto & Masamune in Jour. Trop. Agric. **2:** 34 (1930). — Yamamoto & Mori in Sylvia, **5:** 44 (1934). — Kanehira, Formosan Trees, 470 (1936).

DISTRIBUTION: Formosa.

SPECIMENS EXAMINED:

FORMOSA: Tam-sui, *A. Henry,* no. 1468, date lacking (NY); Tam-sui, *R. Oldham,* no. 35, April 1864 (NY); common in forests near Nanwo, Prov. Karenko, *E. H. Wilson,* no. 11117, Nov. 26, 1918 (tree 10 m. high, fruit black) (AA, NY); Kelung, *C. Ford,* no. 27, date lacking (G); Kelung, *O. Warburg,* no. 9975, Jan. 1888 (AA); vicinity of Sozan, *T. Tanaka,* no. 115, June 22, 1929 (AA).

To date this variety has been collected only on the island of Formosa. By Yamamoto it was characterized as having larger and obovate leaves. This size characterization may apply to the Formosan material but hardly to the species as a whole when one considers the Chinese and Indian material. For a generalization, the shape of the leaf might better be designated obovate-elliptic because there is usually a distinct even tapering from the center of the leaf to the base. The obovate character of the apex in this variety is very variable. In some cases, the apex is nearly subrotund, slightly contracted into a very short rounded acumen. In other instances, still obovate, the apex tapers quite abruptly to a point. Finally, in some leaves, the apex appears actually emarginate. The pedicels are quite short, seldom more than 7 mm. long. As a result of the latter, specimens with crowded immature fruits resemble *Ilex rotunda* Thunberg very closely.

**Cleyere japonica** Thunberg emend. Sieb. & Zucc. var. e. **lipingensis** (Handel-Mazzetti), comb. nov.

*Eurya ochnacea* (DC) Szyszylowicz var. *lipingensis* Handel-Mazzetti in Akad. Anz. Wiss. Wien, 1921, p. 180 (Pl. Nov. Sin. Forts. 13, p. 14) (1921); Symb. Sin. **7**: 399 (1931).

*Sakakia longicarpa* Yamamoto in Jour. Soc. Trop. Agric. **5**: 350 (1933).

DISTRIBUTION: Kweichou, Hainan and Formosa.

SPECIMENS EXAMINED:

KWEICHOW: Kutschou et Liping, in silva frondosa prope vicum Dayung, alt. 700 m., *Handel-Mazzetti,* no. 10938 (isotype) July 22, 1917 (tree) (AA); in light woods, *Y. Tsiang,* no. 4133, Jan. 25, 1931, (tree, 4 meters high, bark green, leaves deep green above, pale beneath; fruit blackish) (AA, NY). HAINAN: in woods, alt. 600 m., Yaichow, *F. C. How,* no. 70311, March 6, 1933 (tree 13 m. high with gray bark; leaves light green above, pale green beneath, coriaceous; fruit green when young, black when mature) (AA, NY); heavily wooded ravine, Hung Mo Mt. above Fan Ra, Hung Mo Tung, *McClure & Fung,* no. 751,

August 24, 1929 (NY, AA). FORMOSA: in monte Tsugitakayam, alt. 2100 m., *Y. Simada*, Oct. 9, 1925 (leaf specimen only) (AA).

This variety is most unusual in the genus because of the serrate leaves. In all other representatives of *Cleyera*, the leaves are entire. Without flower and fruit one naturally would be inclined to place it in the closely related genus *Eurya*. Handel-Mazzetti in drawing up his description, had only a single "wilted" corolla and, judging from the isotype in the Arnold Arboretum, a few immature fruits. Tsiang's specimens in both the Arnold Arboretum and the New York Botanical Garden are sterile. Yamamoto, during his recent American visit, left with me fragments and tracings of some of the Formosan Theaceae. Of his *Sakakia longicarpa* only a leaf specimen is available. However, this leaf is a nearly perfect match with those on Handel-Mazzetti's isotype. Besides leaf serration, Yamamoto lists ciliate calyx lobes and oblong fruit as characters separating his species from *Sakakia ochnacea*. This fruit variation is not uncommon in the whole genus and ciliate calyx lobes are considered a good character of *Cleyera japonica*.

At first, having only fragmentary representation from the far removed localities, Yunnan and Formosa, one naturally would be loth to combine the two. Later, when Tsiang's Hainan specimens were studied, the related identity became more of a certainty.

## EXCLUDED SPECIES

*Cleyera albopunctata* (Grisebach) Krug & Urban in Engler, Bot. Jahrb. **21:** 537 (1896) = **Ternstroemia albopunctata** Grisebach, Cat. Pl. Cub. 36 (1866).

*Cleyera elegans* (Tulasne) Choisy in Mém. Soc. Phys. Genève, **14:** 110 (1855) = **Freziera elegans** *Tulasne* in Ann. Sci. Nat. ser. 3, **8:** 336 (1847).

*Cleyera integrifolia* (Bentham) Choisy in Mém. Soc. Phys. Genève, **14:** 112 (1855) = **Freziera integrifolia** Benth. Pl. Hartweg. 6 (1839).

*Cleyera Matsudai* Hayata in Sched. Herb. Univ. Imp. Taihoku, no. H. 174, nomen nudum = **Eurya Matsudai** Hayata, Ic. Pl. Formos. **9:** 6 (1920).

*Cleyera mexicana* (Turczaninow) Planchon ex Hemsley, Biol. Centr. Amer. Bot. **1:** 93 (1879) = **Freziera** sp.

*Cleyera Nimanimae* (Tulasne) Krug & Urban in Engler, Bot. Jahrb. **21:** 540 (1896) = **Freziera Nimanimae** Tulasne in Ann. Sci. Nat. ser. 3, **8:** 338 (1847).

*Cleyera serrulata* Choisy in Mém. Soc. Phys. Genève, **14:** 110 (1855) = **Ternstroemia** ? sp.

CLEYERA JAPONICA THUNBERG

FULL-TONE — MERIDEN